

**Article title: Association between endogenous sex steroid hormones and insulin-like growth factor proteins in US men**

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Online resource 2. Associations of IGFBP-3 (ng/mL) and sex steroid hormones by selected baseline characteristics of the U.S. male population of 20 years or older, NHANES III 1988-1991

Characteristic	Slope†	95% CI	P-trend†	P-interaction‡
<b>Total testosterone, ng/mL</b>				
Age, years				
≤43	0.01	-0.01, 0.04	0.16	
>43	0.01	-0.01, 0.03	0.30	0.34
Race/ethnicity				
Non-Hispanic white	0.01	-0.01, 0.03	0.21	
Non-Hispanic black	-0.01	-0.05, 0.02	0.35	
Hispanic	0.03	0.01, 0.06	0.01	
Other	-0.003	-0.06, 0.06	0.92	0.33
Obesity (BMI/waist circumference)				
Not obese/not obese	-0.01	-0.02, 0.01	0.37	
Obese/not obese or not obese/obese	0.06	0.02, 0.10	0.005	
Obese/obese	0.03	-0.01, 0.07	0.12	0.07
Diabetes				
No	0.01	-0.01, 0.03	0.38	
Pre-diabetes	-0.003	-0.03, 0.03	0.83	
Yes	0.04	-0.05, 0.12	0.35	0.66
<b>Free testosterone, ng/mL</b>				
Age, years				
≤43	0.02	-0.01, 0.04	0.17	
>43	0.03	0.01, 0.05	0.02	0.61
Race/ethnicity				
Non-Hispanic white	0.01	-0.01, 0.04	0.32	
Non-Hispanic black	-0.01	-0.06, 0.03	0.60	
Hispanic	0.02	-0.01, 0.04	0.19	
Other	0.01	-0.05, 0.07	0.64	0.95
Obesity (BMI/waist circumference)				
Not obese/not obese	-0.003	-0.02, 0.02	0.74	
Obese/not obese or not obese/obese	-0.02	-0.06, 0.02	0.14	
Obese/obese	0.01	-0.02, 0.05	0.04	0.02
Diabetes				
No	0.004	-0.02, 0.03	0.70	
Pre-diabetes	0.01	-0.02, 0.05	0.52	
Yes	0.03	-0.07, 0.13	0.59	0.36
<b>Total estradiol, pg/mL</b>				
Age, years				
≤43	-0.02	-0.04, 0.003	0.09	
>43	-0.02	-0.04, 0.003	0.08	0.06
Race/ethnicity				
Non-Hispanic white	-0.02	-0.05, -0.001	0.05	
Non-Hispanic black	-0.004	-0.04, 0.03	0.83	
Hispanic	-0.001	-0.02, 0.01	0.16	
Other	0.001	-0.05, 0.06	0.96	0.75
Obesity (BMI/waist circumference)				

Not obese/not obese	-0.02	-0.04, 0.01	0.18	
Obese/not obese or not obese/obese	-0.05	-0.08, -0.01	0.007	
Obese/obese	-0.02	-0.05, 0.01	0.19	0.39
Diabetes				
No	-0.02	-0.04, -0.003	0.03	
Pre-diabetes	-0.02	-0.05, 0.01	0.16	
Yes	0.01	-0.05, 0.07	0.71	0.63

#### Free estradiol, pg/mL

Age, years				
≤43	-0.02	-0.04, 0.004	0.10	
>43	-0.01	-0.04, 0.02	0.46	0.94
Race/ethnicity				
Non-Hispanic white	-0.02	-0.04, 0.006	0.14	
Non-Hispanic black	0.002	-0.03, 0.04	0.91	
Hispanic	-0.002	-0.02, 0.02	0.76	
Other	0.01	-0.04, 0.07	0.57	0.58
Obesity (BMI/waist circumference)				
Not obese/not obese	-0.01	-0.03, 0.01	0.32	
Obese/not obese or not obese/obese	-0.04	-0.08, -0.003	0.04	
Obese/obese	0.01	-0.02, 0.04	0.67	0.06
Diabetes				
No	-0.02	-0.03, 0.01	0.07	
Pre-diabetes	-0.01	-0.04, 0.01	0.31	
Yes	0.02	-0.05, 0.10	0.51	0.43

#### SHBG, nmol/L

Age, years				
≤43	-0.02	-0.04, -0.001	0.06	
>43	-0.05	-0.08, -0.02	0.001	0.01
Race/ethnicity				
Non-Hispanic white	-0.01	-0.03, 0.004	0.11	
Non-Hispanic black	-0.04	-0.07, -0.01	0.01	
Hispanic	-0.04	-0.07, -0.001	0.05	
Other	-0.03	-0.11, 0.05	0.39	0.007
Obesity (BMI/waist circumference)				
Not obese/not obese	-0.002	-0.02, 0.01	0.79	
Obese/not obese or not obese/obese	-0.03	-0.09, 0.03	0.34	
Obese/obese	-0.09	-0.13, -0.05	<0.001	0.002
Diabetes				
No	-0.01	-0.03, 0.01	0.47	
Pre-diabetes	-0.02	-0.05, 0.007	0.14	
Yes	-0.12	-0.18, -0.05	0.001	0.09

#### Androstanediol glucuronide, ng/mL

Age, years				
≤43	-0.001	-0.01, 0.01	0.83	
>43	0.02	0.01, 0.03	0.001	0.03
Race/ethnicity				
Non-Hispanic white	0.005	-0.01, 0.01	0.36	

Non-Hispanic black	-0.004	-0.03, 0.02	0.71	
Hispanic	0.004	-0.01, 0.02	0.60	
Other	-0.01	-0.07, 0.05	0.71	0.33
Obesity (BMI/waist circumference)				
Not obese/not obese	-0.002	-0.01, 0.01	0.78	
Obese/not obese or not obese/obese	0.01	-0.01, 0.04	0.35	
Obese/obese	0.003	-0.03, 0.04	0.86	0.17
Diabetes				
No	-0.01	-0.02, 0.01	0.28	
Pre-diabetes	0.02	-0.003, 0.04	0.10	
Yes	0.01	-0.04, 0.06	0.70	0.22

Abbreviations: BMI, body mass index; SHBG, sex hormone binding globulin

† From a weighted linear regression model per 1 quintile change in sex steroid hormones on IGFBP-3 adjusted for age, race/ethnicity, body mass index, waist circumference, diabetes, alcohol consumption, cigarette smoking, physical activity, plus testosterone, estradiol, and SHBG mutually adjusted, and free testosterone and free estradiol mutually adjusted

‡ P-value for interaction using ordinal variables for sex steroid hormones, and age (dichotomized at the median of 43 years), race/ethnicity, obesity (using  $BMI \geq 30 \text{ kg/m}^2$  and  $\text{waist circumference} \geq 102 \text{ cm}$ ), diabetes and product variables thereof